Conditional Statements

title

Conditional statement—a logical statement with two parts, a hypothesis and a conclusion

If-then form:
- hypothesis— the part after "if"
- conclusion—the part after "then"

$p \to q$

If an angle is a right angle, then it measures 90°.

p Hypothesis

q Conclusion

conditional statements

Write the conditional statements in if-then form.

Shane's football game will be postponed if it does not stop raining.

hypothesis

If it does not stop raining then Shane's football game will be postponed.

An even number is divisible by 2.

hypothesis

If it's an even number then its divisible by 2.

examples

Symbolic Notation

p: hypothesis

$\to$ or $\Rightarrow$ is read as "implies"

q: conclusion

Conditional statement: $p \to q$ or If *p*, then *q*.

Write the following statement: $p \to q$

p: Points *A*, *B*, and *C* are collinear.

q: Points *A*, *B*, and *C* lie on the same line.

If points A, B, C are collinear then they lie on the same line.

symbolic notation

Negation—the negative of a statement

- The negation symbol is ~. ~p

p: x is an odd number. q: Angle A is not acute.

Write the following phrases:

~p: x is not an odd #.

~q: Angle A is acute.

negation

Converse—**SWITCH** the hypothesis and conclusion

- Symbolic notation: $q \rightarrow p$

Write the CONVERSE of the following statement.

If you are in Oklahoma, then you are in the United States.

If you are in the US then you are in OK.

converse

Inverse—**NEGATE** the hypothesis and conclusion

- Symbolic notation: $\sim p \rightarrow \sim q$

Write the INVERSE of the following statement.

If you are in Oklahoma, then you are in the United States.

If you're not in OK then you're not in US.

inverse

Contrapositive—**SWITCH & NEGATE** the hypothesis and conclusion

- Symbolic notation: $\sim q \rightarrow \sim p$

Write the CONTRAPOSITIVE of the following statement.

If you are in Oklahoma, then you are in the United States.

If you're not in US then you're not in OK.

contrapositive

Equivalent statements—two statements that are both true or both false

- A conditional statement is equivalent to its contrapositive.
- The converse is equivalent to the inverse.
- FOLLOWS LOGICALLY = contrapositive

equivalent statements

Biconditional statement—a statement that contains the phrase "if and only if"

- The symbol for "if and only if" (iff) is $\leftrightarrow$ or $\Leftrightarrow$.
- Symbolic notation: $p \leftrightarrow q$
- Equivalent to writing a conditional statement *and* its converse.
- To be true, *both* the conditional statement and its converse must be true.

biconditional statements

Write the converse of the true statement.

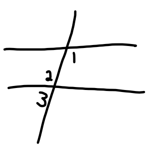
Decide whether the converse is true or false.

If the converse is also true, combine the statements to write a true biconditional statement. If false, provide a counterexample.

If two angles form a linear pair, then they are supplementary.

If two angles are supplementary then they form a linear pair.

False



∠1 and ∠3 They are supplementary but are not a linear pair.

examples

Write the converse of the true statement.

Decide whether the converse is true or false.

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If two rays form a straight angle, ~~then~~ iff they are opposite rays.

If two rays are opposite rays then the form a straight angle.

TRUE

Two rays form a straight angle iff they are opposite rays.

examples

Conclusion

1. Where is the hypothesis located on a conditional statement? after if

2. What happens to a conditional when you find: converse, inverse, contrapositive?
switch negate switch + negate

3. What is the only way you can write a biconditional? If conditional + converse are both true

4. Which statements are equivalent to each other? Conditional & Contrapositive
Converse & Inverse

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Assignment

Conditional Wkst #1

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